

REMARKS

This responds to the first Office Action. Upon entry of this amendment, claims 7 and 10-12 remain pending. Claim 7 is the only independent claim.

The limitations of claims 8 and 9 have been incorporated into claim 7. As such, the Examiner's rejection of claims 7 + 8 + 9 is the focus of these remarks.

The Examiner rejected claims 8 and 9 as being unpatentable over U.S. Patent No. 5,185,671 to Lieberman et al. (Lieberman) in view of U.S. Patent No. 5,708,693 to Aach et al. (Aach). It is respectfully submitted that amended claim 7 (including the subject matter of original claims 8 and 9) defines over the combination of Lieberman and Aach.

No Motivation to Combine Lieberman and Aach

The *Lieberman* and *Aach* documents are unrelated and one of ordinary skill in the art would not have been motivated to combine the disclosures thereof as proposed by the Examiner.

Lieberman relates to an image data processing method wherein there is no enhancement of the original image data. The data are analyzed solely to determine if adjustments to the camera position, lighting, etc. are required. *Lieberman* doesn't derive an enhanced image based upon the original data; instead, the camera and lighting are adjusted to improve the newly acquired images. Also, *Lieberman* also relates solely to standard (high-pass) homomorphic filtering which differs from that recited in claim 7 as described below.

Aach relates to an image processing method for image enhancement. *Aach* does not disclose or suggest use of homomorphic

filtering method and such would not be required for the medical images to which *Aach* relates, given that the exposure is carefully controlled by the x-ray or other imaging machine and will not be uneven. As such, it is respectfully submitted that the Examiner's proposed combination of these documents is improper.

The Pending Claims Define Over Lieberman and Aach

It is respectfully submitted that, even if combined as proposed by the Examiner, the *Lieberman* and *Aach* documents do not lead to the method defined in amended claim 7.

As noted, *Lieberman* relates to the general use of standard homomorphic filters that are acknowledged by the applicant to be known. *Aach* discloses the general concept of using subsampled image data for image processing operations. There is nothing in either the *Lieberman* or *Aach* documents that discloses or *fairly* suggests the method as recited in amended claim 7 of deriving lightsource data that represent an image of a lightsource in the input image from the input data by:

- (i) subsampling said input data to obtain subsampled data defining a subsampled image;
- (ii) low-pass filtering said subsampled data, wherein said step of low-pass filtering comprises:
 - (ii)(a) performing a Fourier transform operation on said subsampled data to define said subsampled data in a frequency domain; (ii)(b) low-pass filtering said subsampled data in the frequency domain; and,
 - (ii)(c) performing an inverse of said Fourier transform operation on said low-pass filtered subsampled data to define said low-pass subsampled data in a spatial domain;
- (iii) upsampling said low-pass filtered data to derive said lightsource data that define a full-scale image of said lightsource;

Claim 7 further includes a step of "deriving enhanced data that represent an enhanced version of said input image, said enhanced data obtained by removing the effect of said lightsource data from

the input data."

It is important to note that claim 7 specifically defines the method as being performed in a xerographic or other non-impact printing/copying environment. As described on page 2 of the present disclosure, standard homomorphic filtering is not feasible in modern printing copying environments because the image resolutions of 300 or 600 dpi require *huge FFT's of sizes 1000 x 1000 to 6000 x 6000 pixels*. As such, the present development, as defined in amended claim 7, allows for a *suitable approximation* of a standard homomorphic filtering method in such a printing/copying environment.

It is further noted that the homomorphic filtering of *Lieberman* relates is a standard operation wherein the image data are subjected to a high-pass filter operation to "highlight edges and reduce slowly varying contrast gradients. . . ." (see *Lieberman*, col. 2, line 60. This is also apparent in Fig. 2 of *Lieberman*, wherein the "homomorphic filtering system" 32 includes only a high-pass filter "H.P. Filter 70." The Examiner is also asked to consider col. 4, lines 36-68 of *Lieberman* wherein the homomorphic filtering system 32 is described as including a high-pass filter 70 and wherein it is expressly stated that the high-pass filter is required to suppress the low-frequency aspects of the image data. As such, *Lieberman* is consistent with the background section of the present application where standard homomorphic filters are discussed.

Amended claim 7 is in direct contrast to *Lieberman* and other standard homomorphic filtering operations. Page 7 of the applicant's disclosure specifically addresses the low-pass nature

of the present development, which is in contrast to the method of *Lieberman* or other standard homomorphic filtering operations.

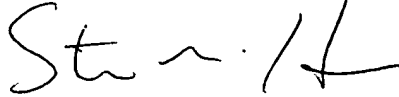
The general disclosure of low-pass filtering with subsampling of *Aach* does not overcome the deficiencies of *Lieberman*. In the abstract, these are simply general concepts of image processing. Claim 7 relates to a particular application of low-pass filtering and subsampling in order to approximate a homomorphic filtering operation in an way that is fast enough for an image printing/copying environment. Neither *Aach* nor *Lieberman* relate to or disclose or suggest such a method as now recited in claim 7.

Dependent Claims 10-12

Dependent claims 10-12 are also patentable for the additional limitations recited therein. With specific reference to claims 10 and 11, these define methods for deriving enhanced data (last recited step of claim 7) by subtracting the lightsource data from the input data (claim 10) or by dividing the input data by the lightsource data (claim 11). There is clearly no disclosure or suggestion of these steps in the documents of record, especially given that *Lieberman* relates to a standard (high-pass) homomorphic filtering operation where such subtraction/division steps are not required because the standard filtering operation acts in a high-pass manner to suppress the lightsource data.

With the foregoing distinctions in mind, it is respectfully submitted that there is no disclosure or fair suggestion in the cited documents for an image enhancement method for a non-impact printing/copying environment as recited in claim 7 and dependent claims 10-12. A formal Notice of Allowance is requested.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Steven M. Haas", written over a horizontal line.

Steven M. Haas (Reg. No. 37,841)
Fay, Sharpe, Fagan, Minnich & McKee, LLP
1100 Superior Avenue - Seventh Floor
Cleveland, OH 44114-2518
Telephone (216)861-5582